



Integrating the Joint Strike Fighter into the Australian Defence Force



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New Air Combat Capability (NACC) Project

- In June 2002, Australia decided to join JSF development phase.
- Proposed replacement of the Air Combat and Strike capabilities provided by F/A-18 Hornet and F-111.
- Replacement required next decade.
- NACC Project
 - Provide S&T advice to support JSF acquisition approval.
 - Large scale participation across Government, Defence and Industry.
 - Focus of presentation is on Operational Analysis activities.



Presentation Outline

- Key Questions
- Operational Issues for the JSF
- Methodology to Answer Key Questions
- Examples of Studies for Operational Concepts Development



Key Questions for Project NACC

- What are the operational requirements for Air Combat and Strike?
- How can the JSF be used to best meet these requirements?
- What are the required numbers of JSF aircraft?
- What are the force balance issues for the New Air Combat Capability?



Air-to-Air Refueling
(AAR) tanker



Airborne Early
Warning and Control
(AEW&C)



Unmanned Aerial Vehicle
(UAV)



JSF capability as a platform

Cockpit

- Helmet Mounted Display and voice control

AESA Active Radar

- Agile beam steering
- Includes continuous Multi-Target Track and SAR modes

Electro-Optical Targeting System (EOTS)

- Targeting FLIR and IRST

Distributed Aperture System (DAS)

- Multiple distributed IR sensors for all-aspect passive IR sensing

Weapons

- Air-to-Air
- Air-to-Surface

Single Engine



EW

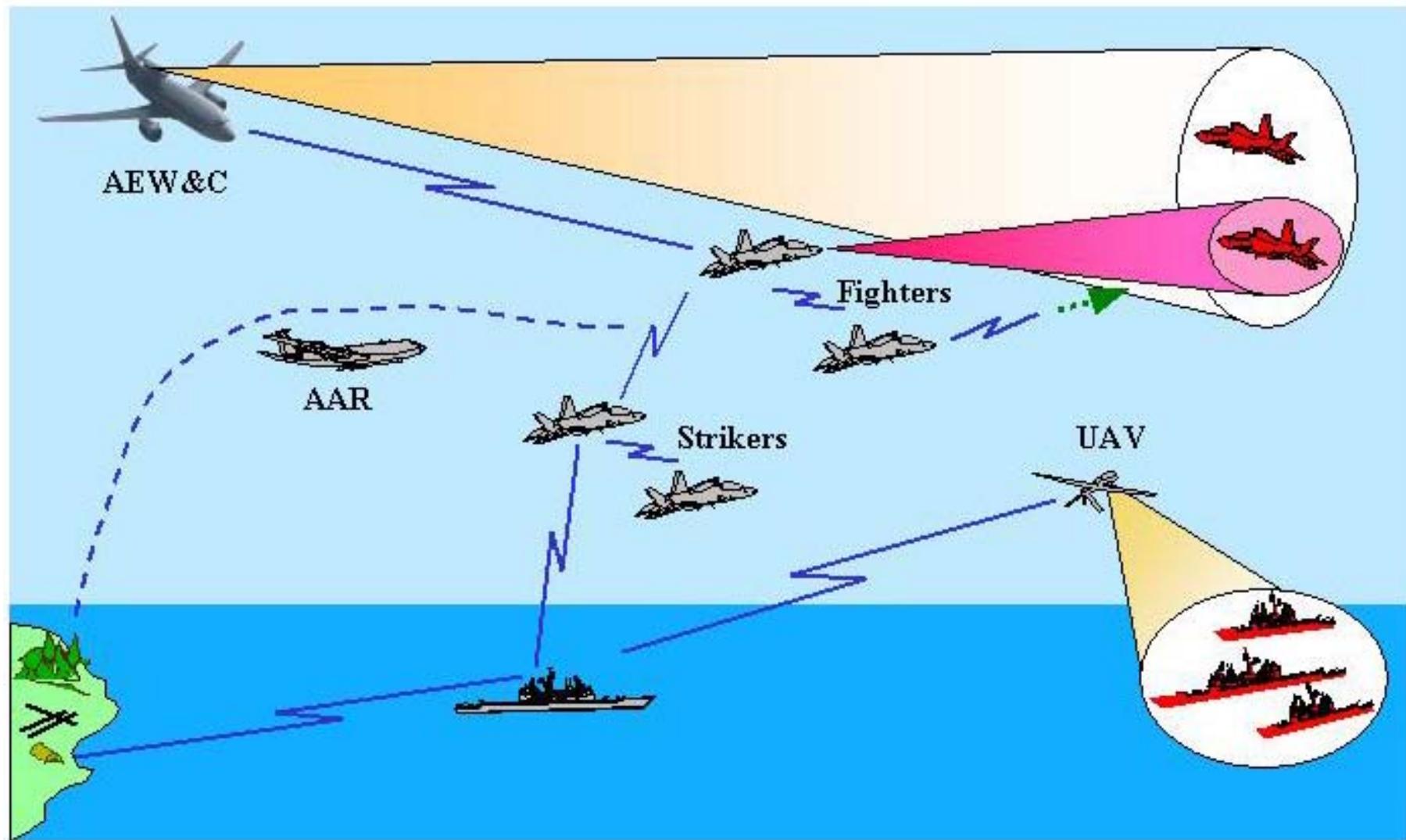
- ESM
- Radar Warning
- Jammer
- Counter-Measures

Stealth

- Shaping and radar absorbing materials
- Internal weapon carriage



JSF capability in a Network Centric Environment





Overall Methodology to Answer Key Questions

WHY

Establish the operational requirements



WHAT

Determine what systems can be used to achieve the operational requirements



HOW

Determine how to best use systems in Missions



HOW

Determine how to best use systems in Theatre



Theatre requirements
for deployed systems



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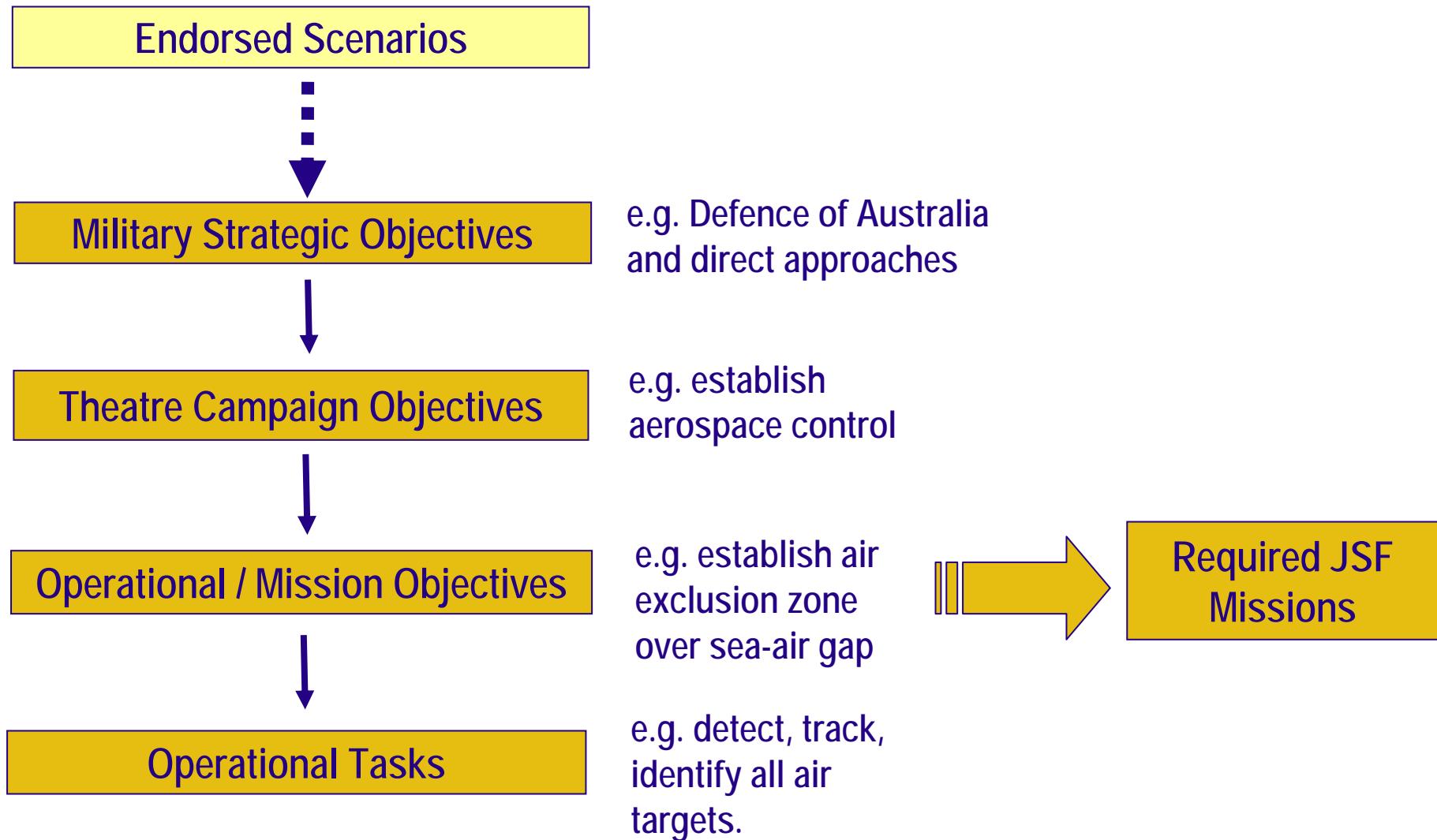


HOW

Determine how to best use systems in Theatre

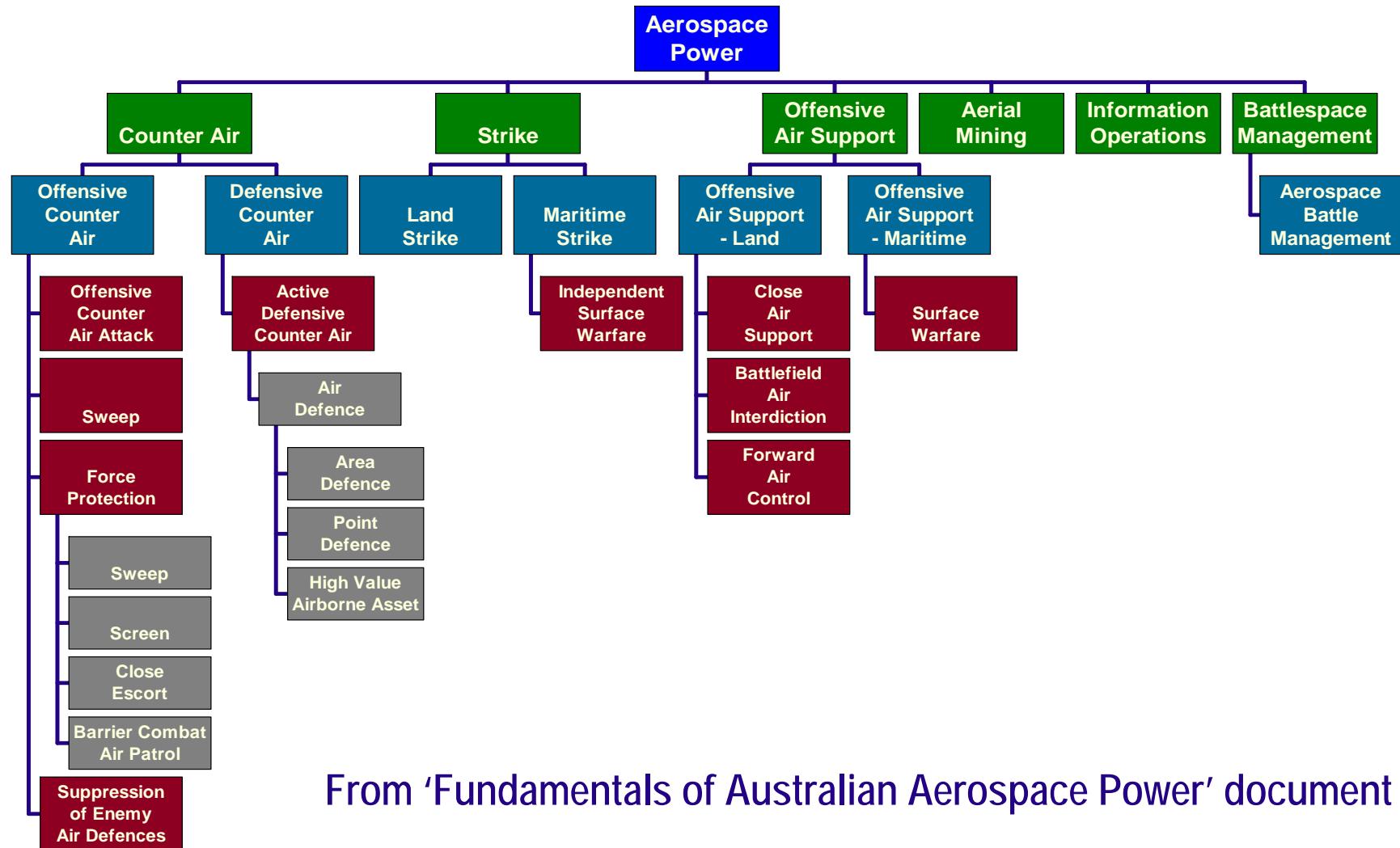


Strategy-To-Task





Mission Considerations



From 'Fundamentals of Australian Aerospace Power' document



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Work Domain Analysis

Functional Purposes
(Missions)

..... Defensive Counter Air

Priorities & Values
(RoE, Doctrine)

..... Maximise Situation Awareness

Generalised Functions

..... Detection, classification & tracking

System Functions

..... Target Acquisition

Physical Forms
(Systems)

AESA
Radar

DAS
IR

EOTS
IRST

Data-Link to
other JSF

Data-Link
to AEW&C

Data-Link to
other ISR
platforms



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Definitions

➤ Concepts of Operation (CONOPS)

How to use current equipment, today, or in near future.

➤ Tactical Procedures

Put CONOPS into practice.

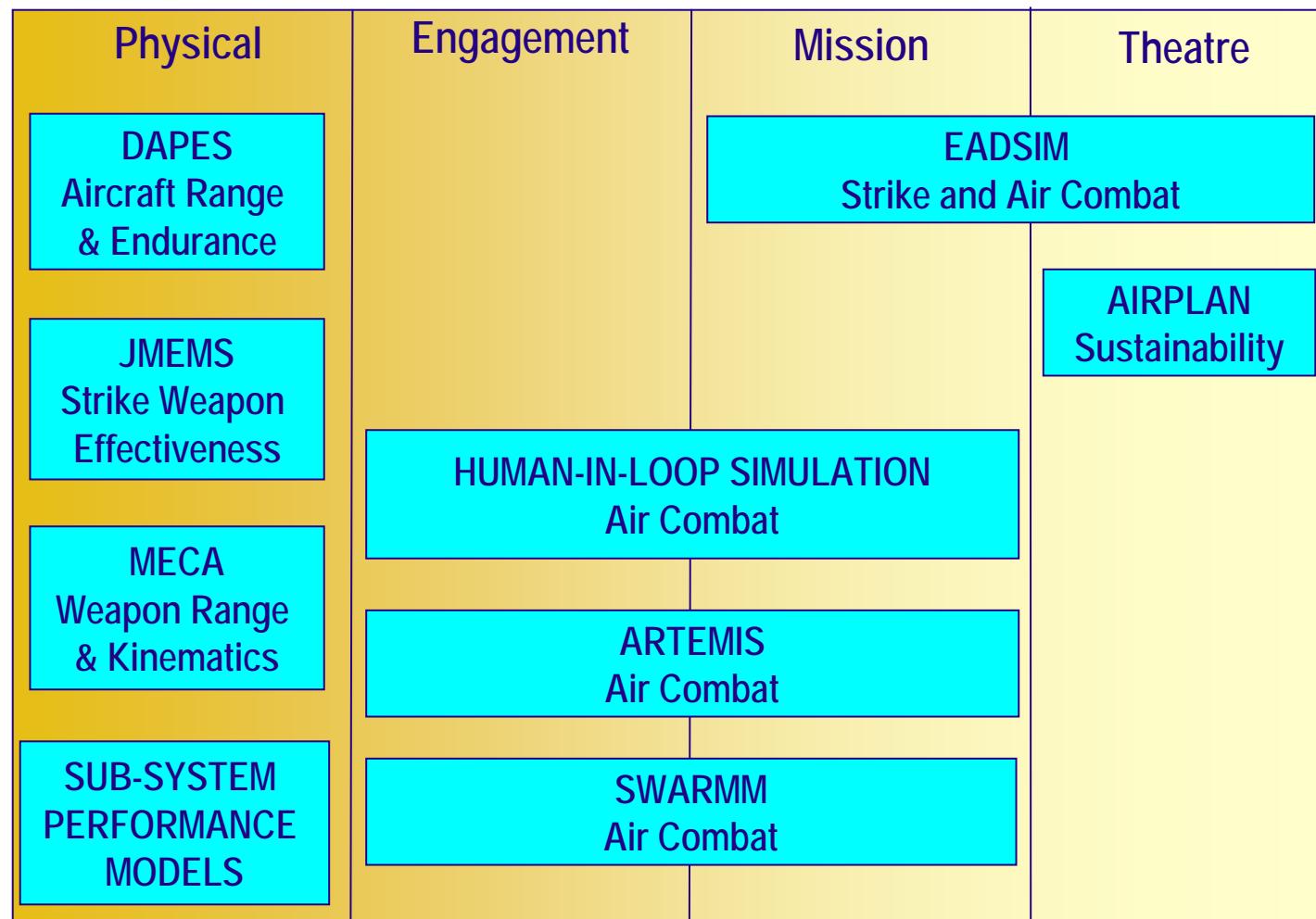
Developed at the ADF Unit level.

➤ Operational Concepts (Op. Concepts)

Conceived use of current or future systems.



Categories of Models



— Increasing Scale —

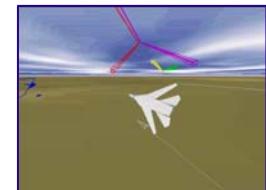


Developing Operational Concepts for Air Combat

Current CONOPS

New concepts

Proposed
Operational
Concepts



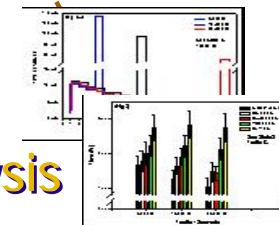
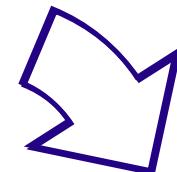
Constructive Simulation
with ARTEMIS

Modelling/
Studies

Tactics
Refinement

JSF
Air Combat
Simulation

Testing
&
Evaluation



Analysis

Effects of
Tactical
Parameter
Variations



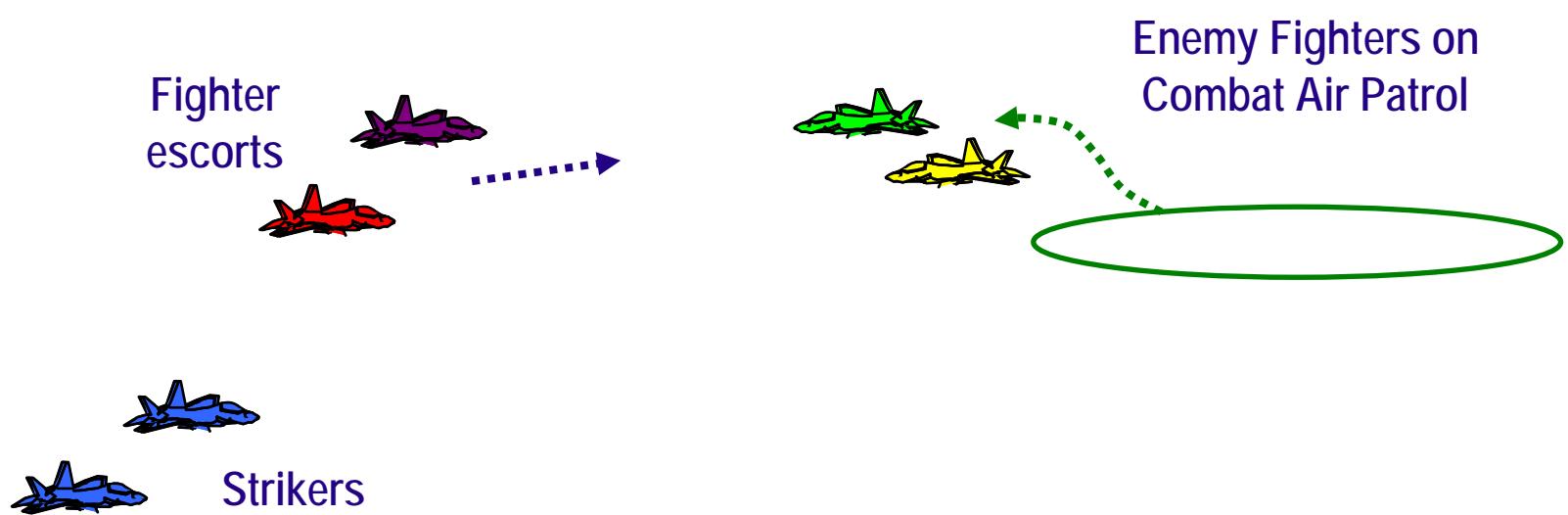
HUMAN-IN-THE-LOOP
SIMULATION



An example Air Combat study

Escort mission: Two fighter escorts protecting two strikers against two enemy CAP fighters

Beyond Visual Range fighter engagement

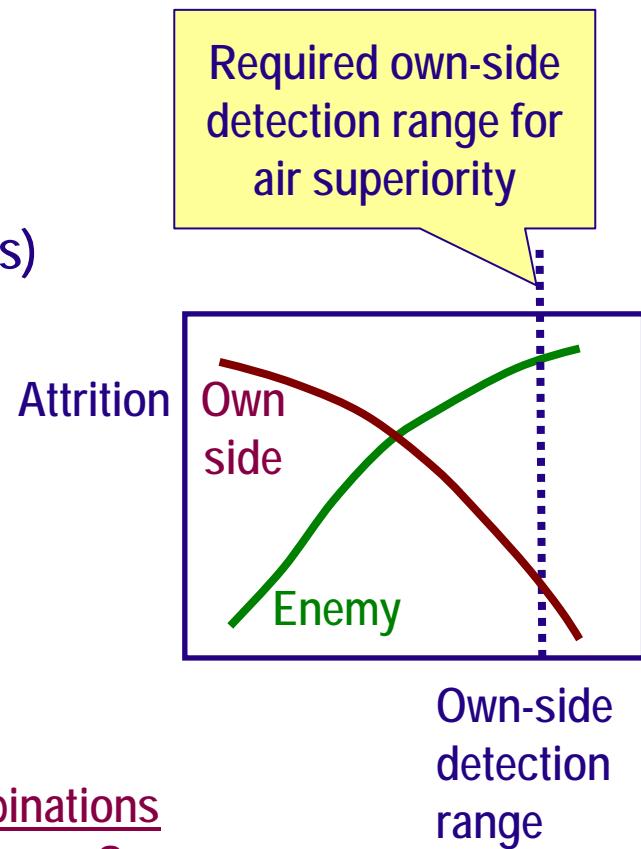




An example Air Combat study (continued)

Examine effect of tactical parameter variations on mission outcomes:

- Detection range relative to threat detection range
 - On-board sensor range
 - Extended sensor range (via data-link to fighter teams)
 - Enhanced sensor range (via data-link to AEW&C)
- Team-coordinated manoeuvre types
Influences who has first weapon shot
- Weapon types and launch conditions
Influences weapon effectiveness



Which tactical parameter combinations lead to desired mission outcomes?



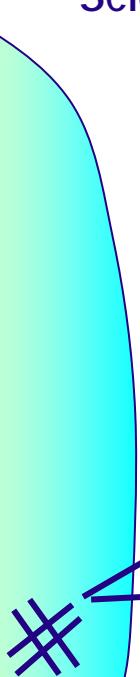
Current Strike studies

Analysis of Weapon Effectiveness against target

Select weapon to match target

Required weapon load-out for striker

Required number of strike sorties

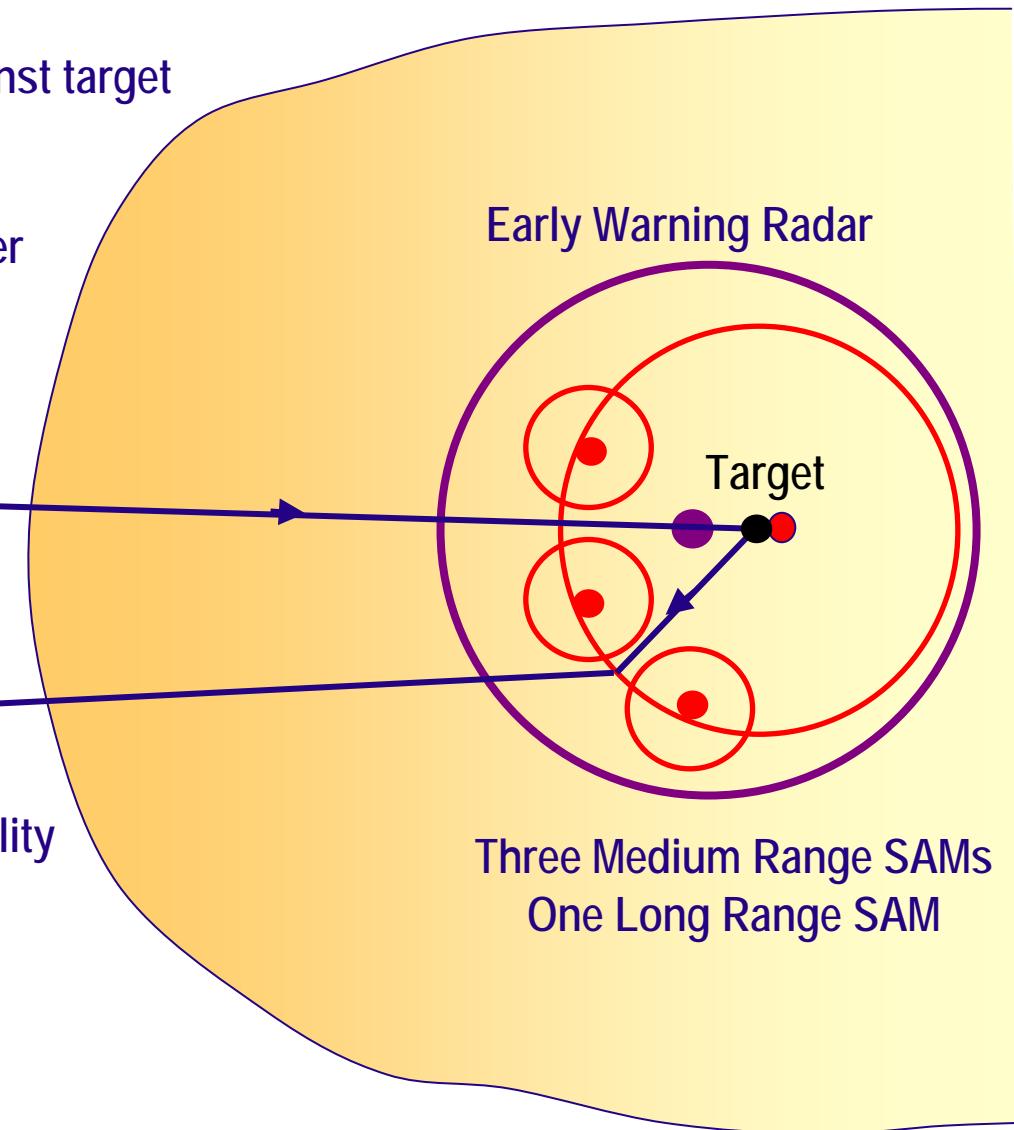


Analysis of Range / Payload capability
Are external fuel tanks required?
Is Air-to-Air Refueling required?

Early Warning Radar

Target

Three Medium Range SAMs
One Long Range SAM





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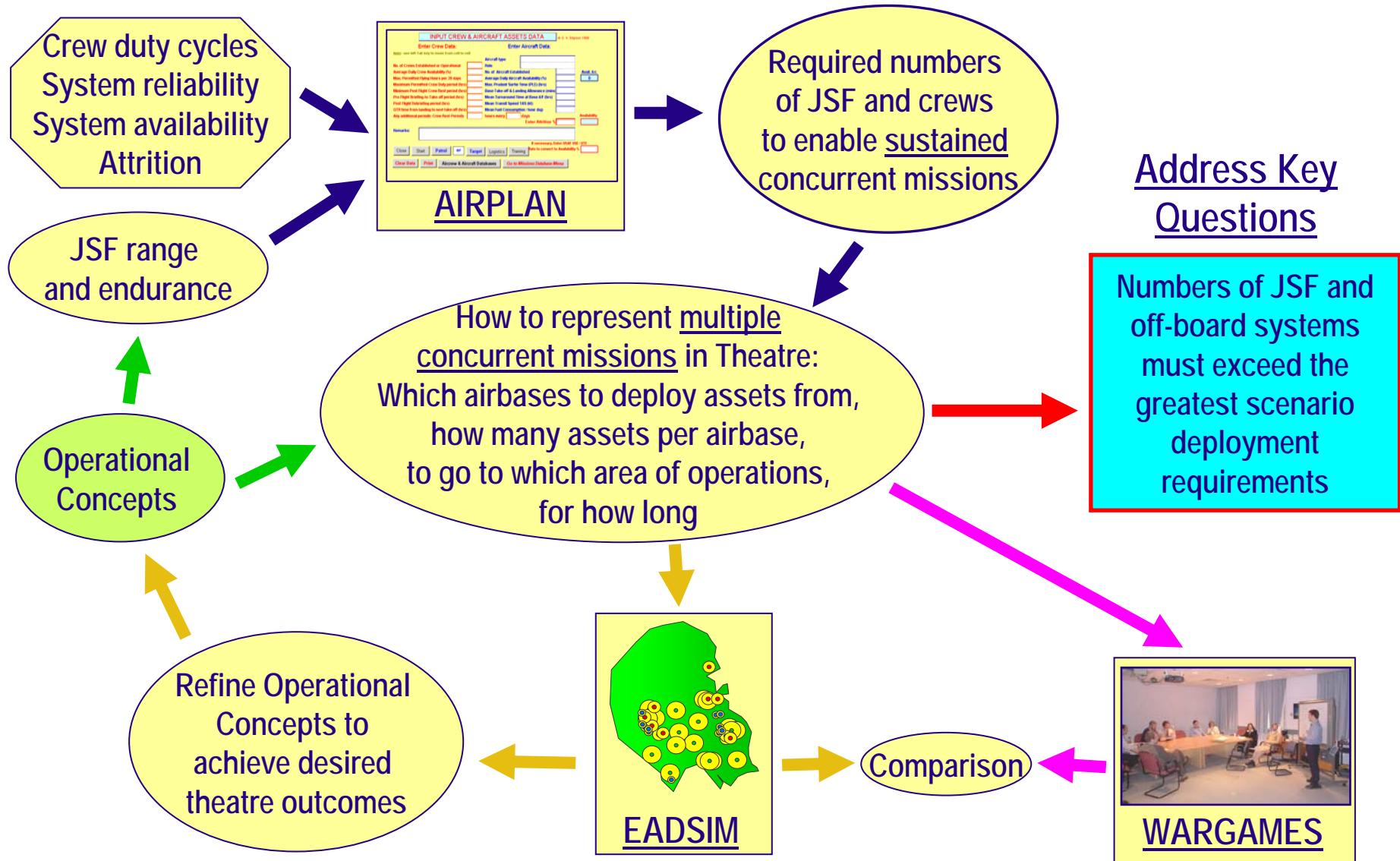


HOW

Determine how to best use systems in Theatre



Theatre-level Analysis





Summary

- Required numbers of JSF and off-board systems depend on how they are used.
- Operational Concepts:
 - To exploit stealth, teaming and Network Centric Warfare
 - Evaluated using a theatre-level capability study
 - To maximise JSF capability for meeting Australian Strategic requirements, primarily Defence of Australia.



Questions?

